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Providence - Introduction of Gas Light. 1848

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REPORT

TO THE

CITY COUNCIL OF PROVIDENCE,

ON THE SUBJECT OF

THE INTRODUCTION OF GAS LIGHT

INTO THE CITY.

SUBMITTED APRIL 10, 1848.

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Providence, R.I. - Standing Committee on Finance

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REPORT.

To the City Council of the City of Providence:

The Standing Committee on Finance, to whom, on the 18th of January last, was recommitted their former Report on the subject of the introduction of the manufacture of Gas into the City; and to whom was referred the Resolutions which passed the Board of Aldermen, and the Memorial of Messrs. Calvert, Dawes, and Burr, upon the same subject, respectfully report:

That they have heard the parties interested; and have made such inquiries, through their chairman, at gas establishments in Baltimore, Philadelphia, Newark, and Boston, of practical gentlemen, in relation to the utility and practicability of its manufacture and use, and also have consulted such authorities upon the subject, as opportunity would allow.

The questions, in this stage of the matter, which most interest the city, are, first, whether the introduction of gas is of practical utility; and, secondly, whether an investment by the city in its manufacture, is expedient.

On these points, the inquiries of the committee have necessarily been first directed to the manufacture of gas from bituminous coal, that manufacture being the best established, and capable of furnishing the surest data for a proper estimation of the subject.

If, on such examination, it should appear that the production of gas from coal has merits sufficient to warrant its introduction; and, on further examination, it should appear that its

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manufacture from other materials has greater advantages; such fact would furnish stronger reasons for the introduction into the city, of gas for lighting.

The manufacture of gas from coal, on a scale for public consumption, has been established in England about forty years; since which time it has become in general use throughout Great Britain, and is now manufactured and consumed to an immense extent. A very large portion of the minor towns have their gas works. In the city of London, no less than three thousand millions cubic feet of gas are annually made; consuming about two hundred and fifty thousand chaldrons of coal. In the early stages of its introduction, it has generally met with a strong opposition; but its convenience and superiority have overcome all obstacles, and its history is a series of triumphs over prejudice.

In this country, it was first introduced for public consumption about twenty-seven years ago, at Baltimore; and has since been established in Boston, New York, Philadelphia, and recently in several other cities. The results to its manufacture and use in this country, where coal is dearer and oil cheaper than those materials are in England, must furnish the surest grounds for determining its practicability.

Of the manufactories in this country, the Philadelphia Gas Works are considered, by those acquainted with the subject, to be equal, if not superior, to any other in existence, unless some of the more recent gas works that have been constructed, may be an improvement upon them. Previous to their establishment, the city of Philadelphia, in 1834, sent an able engineer, Mr. S. V. Merrick, to Europe; who examined the principal gas manufactories in Great Britain, France, and Belgium, and procured an amount of information upon the subject, not before possessed by any individual. His able Report to the Councils of Philadelphia, and the results of the gas establishments constructed in that city under his directions, furnish sufficient grounds for a decision respecting the expediency of the introduction of gas works into this city. Your committee

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will in this place only say, that, after an experience of nearly twelve years, those results have exceeded the most sanguine expectations.

With regard to the economy or utility of lighting with gas, your committee need not enter into the practical details of its advantages; the fact, that in every place where it is established, it comes into general use wherever stationary lights are expedient, is sufficient to establish its superiority over all other modes of lighting.

It has made its way, (even where its manufacture has been very imperfect, and it has consequently been filled with offensive odor,) against strong opposition, into the stores, manufactories, and public buildings, at all places within its reach. In its more perfect manufacture, it is consumed to a considerable extent in private dwellings. It is the history of gas works in this country as well as in Europe, that the demand for gas has generally much exceeded the highest expectations of the projectors of the works. The Philadelphia works afford a striking example of this feature. They were constructed with the view, that a provision to supply four thousand burners would meet the demand for two or three years. In twenty-two months, they supplied over sixty-eight hundred burners, and were compelled to close their book of applications for gas. At the end of ten years, they supplied forty-two thousand five hundred and eighty-eight lights; being an average increase of over four thousand burners each year. Nowhere is there any retrograde in the demand; everywhere, it seems to be onward, gaining with the experience of consumers.

These facts are conclusive as to the opinion of the consumers. That opinion, the result as it is of experience, is more valuable than any theoretical calculations.

With regard to the cheapness of lighting with gas, as compared with oil, since the introduction of the solar lamp, which admits of the use of the cheapest oil or grease; the difference in the expense to the consumer is not of so much consideration as the beauty and convenience of gas. It is quite proba-

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ble that, from the liberal use of light which its convenience induces, more will be expended for gas than for oil, where cheap oil is used. In the street lamps, which require the use of sperm oil, the same quantity of light can be obtained much cheaper from gas than from oil. Yet so much are the inhabitants of the cities where gas light is used, attached to its brilliant lighting, that more is expended, to the lamp, upon gas than upon oil, even at a greatly reduced price of the gas. In the city of London, where the general price of the gas is from one dollar seventy-five cents to two dollars twenty-five cents per thousand cubic feet, about twenty dollars per light is expended per annum. The gas works in Baltimore supply the street lamps at ten dollars a year each; which was estimated to be the cost of lighting with oil, at the time the contract was made. They commenced the hours of lighting on the oil scale, being about fifteen hundred hours per year; but have gradually run up to about two thousand two hundred hours, without an increased charge to the city. The consumption of each light is about ten thousand cubic feet to each lamp per annum; consequently, the Gas Company receive about one dollar per thousand cubic feet. The company, however, consider that they incur a loss of about five dollars per annum at each lamp, exclusive of the interest on their fixtures. The Gas Works in Philadelphia charge that city one dollar seventy-five cents per thousand. Each light is estimated to burn about ten thousand feet per annum; therefore, the cost to each street lamp is about seventeen dollars fifty cents a year. The city of Boston pays the Gas Company of that place one cent per hour, to each street lamp, upon a scale of hours furnished by the city to govern the lighting. The lights usually burn for a longer period than the scale contemplates. Each light is estimated to burn from four to five feet of gas per hour. The Mayor of Albany estimates that the cost of lighting that city with gas, will not exceed twenty-one dollars per annum to each lamp, substitututing one gas light for two or three oil lamps. Lighting with gas has

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been recently introduced into that city, and consequently estimates only could be furnished. The average cost of lighting the streets with oil, in Albany, for the past five years, was about seven dollars fifty cents per annum for each lamp. (In this city, it is from ten to eleven dollars.)

In all of the before mentioned places, the charge to private consumers is at a much higher rate than to the public. In Baltimore, it is four dollars per thousand to private consumers. The city pays about one dollar, as before stated. In Philadelphia, the charge to private consumers is two dollars and fifty cents per thousand; to the city, one dollar and seventy-five cents. In the early operations of the gas works in the last named city, the charge to private consumers was three dollars fifty cents per thousand; which has been, at two different periods, reduced fifty cents per thousand at each time, to the present rate. The Gas Company of Boston charge to private consumers, three dollars and fifty cents per thousand. Until within a few years, this charge was five dollars per thousand. It has been reduced at two periods; first to four dollars, and recently to the present price. The charge to the city has not been varied per hour, but each street light consumes a larger quantity of gas than the original contract contemplated. It is estimated that the Gas Company receive less than two dollars per thousand, for their gas to those lights.

Private consumers burn from three to five cubic feet per hour, varying according to the habits of economy in the consumer. Four feet per hour is considered a fair standard; and will produce, with good gas, a full and satisfactory light to a large majority. Much, however, depends upon the quality of the gas; which is greatly varied by its more perfect or imperfect manufacture and purification, and also by the different characters of the coals used for distillation. In a scientific examination, made in England several years ago, it was found that one cubic foot of gas manufactured by the Liverpool New Gas Company, furnished as much light as three and a half feet of gas from the Nottingham works, three feet from

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the Derby, two and a half feet from the Preston, Bradford, and London, two and a quarter feet from the two companies in Birmingham, two from the Sheffield and Leicester, and from one and a quarter to one and a half feet from the Leeds, Manchester, and Stockport Gas Works. The above is not the exact data furnished by that examination, but is in proximity to it. The qualities had a little more variation than is here indicated. It was reduced to this form of statement that it might be more palpable to the ear.

This great difference in the quality of coal gas, arises from two causes. The first and greatest is the mode of, and care in, its manufacture. The more modern works generally furnish the best gas. Secondly, the coal used for distillation into gas;—the Cannel coal producing the greatest quantity and the best quality of any coal.

A full examination and comparison of the illuminating properties of ordinary coal gas with that of other materials, has furnished data from which to deduce the following. Reducing the imperial to the wine gallon, one hundred and forty-five feet of gas is equal to one gallon of whale oil, and one hundred and eighty feet is equal to one gallon of sperm oil. Thus, the cost of the same quantity of light from those materials on these data, computing the gas at four dollars per thousand,—that being the price which the projected Company in this city propose to sell at,—is equal with whale oil at fifty-eight cents, and sperm oil at seventy-two cents per gallon.

It is, however, quite probable, that from the improvements in the manufacture of gas, which the most modern gas works admit of, that the quality of gas, from the works contemplated in this city, will be materially better than that which furnished the foregoing estimates. If the Cannel coal should be used in the distillation, which is but little more expensive than other coals, no reason is seen why a gas will not be thus produced, fully equal, if not superior, to that manufactured by the New Liverpool Company. In that case, eighty feet of gas will be equal to one gallon of whale oil; which, at four dollars

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per thousand, will cost thirty-two cents. But, if the coal which is commonly used in this country for distillation, shall be manufactured, it may be a fair estimate to give one hundred and twenty feet of gas to be equal to the gallon of whale oil. This estimate, however, is to a considerable extent founded on conjecture; no experiments, known to your committee, have been instituted in this country, to test the comparative quality of different materials for manufacture into gas.

There are other considerations in favor of the use of gas for stationary lights, instead of the use of oil, besides the relative cost of those materials. The use of oil is attended with much trouble in taking care of, and preparing the lamps for use. The light in the solar lamps must be nicely adjusted to burn to the greatest advantage, in order to sustain the capacity for producing light which has been assigned to it. If made too large, much loss and inconvenience arises from the unconsumed oil passing off in the form of smoke. It is not so conveniently adjusted to the varying wants of the consumer as light from gas. With gas apparatus, thoroughly put together, no waste need be made without gross negligence. The burners are always ready for lighting, without any previous preparation; are lighted with great facility, and the lights can be so conveniently varied to the requirements of the consumer, that ordinary attention only is required to consume with proper economy. They are extinguished with but little more than an effort of the will. As little risk against fire, attends their use as with lights from oil; and where gas lights shall supplant the camphene lamps, such risk will be materially diminished.

From the considerations which your committee have herewith presented, they are of opinion that the advantages to be derived from the use of gas, in the production of light, merit the aid of the city in its introduction here.

The aid sought from the city, in its introduction, is by a subscription to the capital stock of the Providence Gas Company; for which purpose, Resolutions have passed the Board

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of Aldermen, and have been referred to your committee. This brings the consideration of the second branch of the subject, namely, whether an investment by the city in its manufacture is expedient; which principally involves the question of profit and loss.

The information obtained on this branch of the inquiry is of a most satisfactory character. No works in the range of their inquiries, however imperfect in their construction, have failed to make very satisfactory profits. It is a part of the history of gas works, that wherever the manufacture of gas from coal has been established, it has been a source of profit to the proprietors.

The Baltimore gas establishment is the pioneer of those works in this country, for the sale of gas. That company commenced operations, for the purpose of supplying a very limited district, in 1820; and from time to time have added to their works as the demand induced extension. Originally inferior to the more recent works, they have been enlarged, piece upon piece, as the public wants demanded; consequently the whole arrangement is a disadvantageous one. It is understood that the works have been profitable to the stockholders, and considerable extensions have been made, out of their earnings. The expense of manufacturihg gas at this establishment, including the interest on its cost, is two dollars and ten cents per thousand cubic feet. The quantity of gas supplied is about thirty-six millions per annum. The daily supply varies from fifty to one hundred and fifty thousand feet Price of gas, as before shown, four dollars per thousand; twelve per cent. deduction for prompt payment.

The gas works in Boston were next in order of time. They were originally erected by an individual, and afterwards sold to the present company, at a very great advance upon their cost. This company, from their profits, have made very satisfactory dividends to the stockholders, and also provided and maintained a surplus fund, from which they have extended their works, street mains, and other fixtures, to meet a constant

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increase of demand for their gas. They have, from this fund, reconstructed their works, and now have a respectable amount on hand. The price of their gas, however, has been higher, until recently, than at any of the other works noticed. The late reduction in price to three dollars and fifty cents per thousand, has produced so much increase of demand, that they contemplate a considerable extension of their works during the present year.

The Gas Works of the city of Philadelphia were erected in the year 1835, and commenced operations in February, 1836. They were originally constructed by the city, for account and benefit of a joint stock company, with a capital of one hundred and twenty-five thousand dollars, and the affairs placed in the hands of trustees appointed by the city. The city reserved the right, at any time, to take the works from the company into the possession of the city, and convert the capital stock into a six per cent. loan, redeemable in twenty years. As funds were required for the extension of the works from time to time, the city issued stock to be applied to that purpose, the company paying the interest on the same, from their earnings. The first year of their operations produced but little profit, and no dividend was declared. In the second year, namely, 1837, the stockholders received a dividend of eight per cent. In the years 1838, 1839, 1840, they divided twelve per cent. per annum; and in February, 1841, six per cent. On the first of March, 1841, the city converted the capital stock of the company into a loan, and gave a bonus to the stockholders, of forty-eight thousand dollars, in a five per cent. loan. This bonus was considered as equivalent to the surplus profits which the company had accumulated. Since that time, the works have been operated on account of the city.

On the first of January, 1846, the following was the standing of the works, viz: The cost of the works, including street mains, service-pipe, meters, and other fixtures, amounted to about six hundred and thirty thousand dollars; for which, and

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the bonus paid to the original stockholders, the city had issued stock to the amount of six hundred thousand dollars. They had on hand, of cash, debts due, and materials, about twenty-seven thousand dollars over and above all other liabilities, and invested into the sinking fund, two hundred and five thousand dollars. Thus, from the first of March, 1841, to the first of January, 1846, a period of less than five years, the works had paid, from their profits, after paying the interest on the loans, about thirty thousand dollars towards their extension, two hundred and five thousand dollars to the sinking fund, and had surplus assets on hand, to the amount of twenty-seven thousand dollars; making the surplus earnings of that period, two hundred and sixty-two thousand dollars. At that time, they reduced the charge for gas to two dollars and fifty cents per thousand; which has continued up to the present time. At this low price, they have been enabled to pay the interest on the loan, carry the appropriation to the sinking fund, and extend their pipes into new neighborhoods, (estimated at ten miles of main each year,) from their earnings.

It must, however, be conceded, that large establishments can be operated to greater advantage than small works; but the difference is believed not to be of much magnitude, after an establishment of the size contemplated in this city, has customers nearly equal to its capacity to supply.

The gas establishments in Newark and Albany are constructed upon a scale of about the same magnitude as the intended works in this city, but they are of too recent erection to furnish any practical information upon the subject of profits. No inquiries have been made at the gas establishments in New York. They are manufacturing gas from rosin, in the lower part of that city.

Respecting the successful operations of gas establishments in England, the following extract from Parnell's "Applied Chemistry," may not be inappropriate:—"It appears that, in most localities in the south of England, where about one hundred lights are required, a coal gas apparatus may be found profitable."

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Upon a review of the facts, it appears to your committee, that a gas establishment in this city, if well managed, *must* be profitable to the stockholders. The directors of the concern will assume an uncommon responsibility. They are bound to make it profitable, or submit to the imputation of bad management. From the well known character of the gentlemen who are engaged in forwarding this enterprise, no fears need be entertained that they will fail to meet their responsibility.

The only point which admits of question in the profitable manufacture of gas, is, whether the demand for it will be sufficient to support the works. From the experience of all, it seems, that it only requires a population and business to furnish customers. Wherever the mains are placed, almost every person within their reach, who can make a stationary light answer his purpose, will take the gas. Estimates of consumption, founded upon the apparent wants of a community, have generally fallen short of the actual demand. The following, from the Report of the Engineer of the Philadelphia Gas Works, made on his return from Europe, will elucidate this point:—"Before planning new works, the usual and most natural course is, to make an approximate estimate of the wants of the place and probable demand; but in most old works that have come under notice, laid out upon such estimates, the demand has increased of late years, so unexpectedly, that the sites and arrangements are found far too limited for present purposes." In a later paragraph of his Report, and connected with his estimate of "the probable consumption of gas in Philadelphia," he observes:—"In Great Britain it has, in growing towns, almost invariably exceeded the most sanguine calculations: and we are not likely to be behind hand in appreciating an improvement, when the value is once understood." In giving his views of the extent of the works required for Philadelphia, he observes, that "provision for four thousand public and private lights, will probably be sufficient to meet the demand for two or three years." Under these impressions, his mind ready, in looking through the city, for

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the elements of consumption, to make liberal allowance beyond what could be seen, his estimate fell greatly below the actual demand. In less than two years, as before stated, they supplied sixty-eight hundred burners; and turned away further applications, until they could increase their works.

It may be instructive to advert to the experience of the gas establishment in the Northern Liberties of Philadelpnia, which has been in operation for about nine years. The Northern Liberties contain about the same number of inhabitants which is contained in this city. The business character of that population, as it relates to their wants for gas, will bear a similar relation to the city of Philadelphia, as the First, Third, and Sixth Wards of this city will bear to the three central wards. That establishment sells from eight to ten millions of feet of gas per annum. The charge is one dollar and seventy-five cents per thousand feet, to public, and three dollars and fifty cents, to private, consumers, with the usual deductions. The cost of gas at these works, including wear and tear, and interest on the works, and all expenses, is about two dollars and fifty cents per thousand feet. Their dividends have been very satisfactory to the stockholders.

It may be safely assumed, that this city, with its business concentrated upon a few streets, interwoven with mechanical manufactories, will not fall short in consumption, of that of the Northern Liberties.

The question may occur, will not the coal cost more in this city than in Philadelphia? If such should prove to be the fact, every dollar per chaldron in cost, will amount to but ten cents per thousand feet. The coals of the British Provinces and of Virginia are used in Philadelphia; the Black Heath variety being considered the most desirable of any coal of the Atlantic slope, which is used in this country for making gas. The greater cost can be only on the Virginia coal, which may be nearly counterbalanced by the greater value of the coke in this market. Coal is the only raw material that can be of greater cost in this city than in Philadelphia.

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The Memorial of Messrs. Calvert, Dawes, and Burr, requests the attention of the City Council to their solar gas. This gas is commonly known as "Crutchet's Gas."

The manufacture of gas from oil, for public consumption, is nearly as old as its production from bituminous coal for the same purpose. The same process, with the same kind of apparatus, is used in the production and storing in the gasometer, of Crutchet's gas, which has been used in England since the year 1815. The only difference which exists between the ordinary oil and "solar gas," is in the admixture of atmospheric air with the latter, as it is taken from the gasometer to carry to the burners. This admixture is about from twenty to thirty-three and a third per cent. of air. The manufacture of both descriptions being the same, it may be well to look into the results of experience, the only safe basis upon which important action can be founded.

Several extensive oil gas establishments have been erected in England, and much angry or excited controversy has existed between the advocates of oil and coal gas; and, consequently, conflicting statements upon the subject have been made. The illuminating property of oil gas, as compared with that from coal, has been variously represented; one foot of oil gas being estimated to be on an equality with from only one and six-tenths, all of the way up to four feet, of coal gas. More of this variation of estimate, in the examiuation of the subject, has probably arisen from the great variety in the qualities of coal gas used in the experiments, than from incorrect observation or dishonest representation. Such variation, as has before been shown, is as one to three and a half, and can easily account for those conflicting statements. From the more recent and most reliable experiments, it appears that ten feet of the best gas which could be made from oil, was equal to sixteen feet of the best gas which could be made from the Cannel coal. It may not be expected, that a gas will be produced in works manufacturing for sale, equal to that which was used in this comparison; but, taking into consideration the improve-

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ments in its manufacture, it may be assumed, that, from carefully conducted works, two feet of gas from coal, will be equal to one foot from oil. When the relative value of the gases is settled, much of the difficulty of making an estimate of the comparative cost of their respective lights, is removed.

To make ten thousand feet of gas, it requires about one chaldron of the coal used in this country, costing seven dollars and fifty cents; from one to ten bushels of lime, (shell is mostly used,) costing ten cents per bushel. From this distillation, one and a half chaldrons of coke is made, which is used for heating the retorts; and the remainder, being nearly one half, is sold. About twenty-four gallons of tar are also made, worth one dollar. The spent lime, for agricultural purposes, is worth much of its cost. It is a safe estimate, that the residuum will pay for all of the other materials except the coal. Thus the materials used in the manufacture, cost not over seventy-five cents per thousand feet. One gallon of whale oil (reducing the Imperial to the Wine gallon) will produce, on an average, seventy-five feet of gas. Thus, to make five hundred feet of oil gas, which is assumed to be equal to one thousand feet of coal gas, it requires six and two-thirds gallons of oil; which, at thirty cents per gallon, (which is believed to be as low as any form of oil can be purchased,) amounts to two dollars for the oil alone, to be equal to one thousand feet of coal gas. To this must be added the fuel for heating the retorts.

To make gas from oil, is a more simple process, and requires less expensive works. This, however, cannot counterbalance the greater cost of materials.

The expense of making coal gas, including all expenses of manufacture, repairs, and sale, amounts, in this country, to from one dollar and twenty-five cents, to two dollars per thousand feet, exclusive of the interest on the works, and distribution.

A cheaper article than oil, for making gas, exists in rosin. This article will produce about one thousand feet to one hundred weight. Its gas is manufactured with the same process,

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and in the same apparatus, with that made from oil, and is but very little inferior in its quality to oil gas. Several manufactories of rosin gas have existed in England, which have gradually yielded, and been converted into coal gas establishments. The gas establishment in the lower part of the city of New York, manufactures gas from rosin, which is distributed unpurified, through leaky pipes, and has filled the soil with offensive odors. It is understood that those works are about to be converred into a coal gas manufactory.

The oil gas establishments in England have yielded to coal gas. A few extracts from authorities upon the subject, may be useful. From the Encyclopedia Britannica:

"Oil being decomposed at a loss of nearly fifty per cent., the conversion of it into gas, after a protracted but ineffectual competition with coal, has been gradually abandoned on the large scale, even in those places where, from the interest of the whale fisheries, there were the strongest inducements to foster the unfounded prejudices which prevailed for some time against the use of coal gas. The exaggerated advantages which it was pretended would be derived from compressing oil gas, and thus rendering it portable, served to prolong the gross delusion on the subject. * * * * Nor were these delusions fully removed, until a demonstration was given of the failure of the scheme, in the decay of costly edifices and expensive apparatus, which, in defiance of all sober calculations, had been constructed for carrying it into effect." Again, from the same authority:—"The capital expended upon oil gas establishments, is actually applied to reduce to the extent of thirty per cent., the intrinsic value of the raw material, which it was pretended to improve in an equal degree; add to this, the loss of gas in the main pipes, which is found to be fully twenty per cent., and it follows, that the light from oil gas is obtained at twice the expense at which it may be procured immediately from the oil itself."

From Parnell's "Applied Chemistry:—"Several extensive oil gas establishments were erected at different places in Great

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Britain; but all these have gradually become converted into coal gas manufactories. Not a slight objection to oil gas, is the gradual liquefaction which its most valuable constituents undergo, on standing with exposure to moderate cold, to the great deterioration of the gas and the clogging of the pipes."

Peckston's "Practical Treatise on the Manufacture of Gas," thus notices the statements that have been made by the advocates of oil gas, in favor of that article:

"If we admit these statements to be correct, we still fall short of the main point upon which any new branch of manufacture depends for success, namely: the manufactured shall be such as the manufacturer can afford to sell at a fair price to the public, and such as will at the same time afford him a remunerating profit for the money he may have invested. In the case of oil gas, it so happened that neither of these ends were accomplished in any one instance; for the parties who used oil gas, found it exceedingly expensive, whilst those who had invested their money in works and apparatus for generating and distributing oil gas, after several years trial in mady cases, and for a sufficiently lengthened period in all, to see whether any profit would arise, found invariably that they had not the remotest chance of realizing any dividend worth naming, by way of paying interest upon their investments."

Thus, the concurrent testimony of the authorities which have been consulted, has fully established, that the manufacture of gas from oil, as a source of profit, in competition with coal gas, has universally failed on a full trial. Such being the fact, the question arises, does the admixture of atmospheric air with the common oil gas, produce so great an improvement as to overcome the disadvantages which experience has thus established? This admixture is the only difference between Crutchet's "Solar Gas" and common oil gas. Such improvement ought to be a well-established fact, before the City Authorities should either rely upon the "Solar Gas" for city purposes, or encourage our citizens to invest in an undertaking that presents so much hazard. The committee have been

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promised documents which would establish that point; and have waited, in vain, two months for their production. They have to rely only upon their own observation and the representations of the gentlemen interested in the "Solar Gas." Those representations, however, fall short of the required improvement.

The committee do not understand that any scientific examination has been made of the illuminating property of the "Solar Gas," as compared with simple oil gas; a fact which is rather surprising. Gentlemen who engage their means and time in a manufacture, which, in one form, has universally failed, ought to satisfy themselves that the new form is an improvement of a character to warrant such engagement; especially where the comparative value of the different forms can so easily, and with such certainty be established, as the illuminating property of the gases.

Messrs. Calvert, Dawes, and Burr, in their communication, say, that more than one hundred and twenty-five "Solar Gas Works have been put up in the United States within four years; many of which are in our most populous cities, and where coal gas pipes pass directly by the doors of the houses where they have been erected." Yet those gentlemen have not furnished data from any one of those establishments, to enlighten the committee upon the subject.

They say, that experiments in England have so established the value of the gases, as to require from three to four feet of coal gas to be equal to one foot of oil gas. This representation is the extreme of the statements of the advocates of oil gas, in the excited controversy which was carried on; and, no doubt, was the result of a comparison with very inferior coal gas. The coal gas, as before shown, varies in illuminating power at the different works, from one to three and a half.

From the basis they have thus laid down, they proceed to estimate the comparative economy of the different kinds of gas from their selling prices, quoting the highest. They put down the coal gas at four dollars per thousand, a price that

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yields a very large profit to the manufacturer. Yet, with their extravagant basis, their figures do not place the economy of coal gas far behind that of oil gas. The question which interests the city, is the economy of production as compared to the value. On that question, there can be but little doubt.

One of the advantages of the oil gas, is the less cost of the works. They say, that "the works necessary for lighting any given district, will cost only from one quarter to one third the price of coal gas works." This representation is widely at variance with the authorities on the subject of gas. Their cost in England were two thirds the cost of coal gas works. It is believed to be more safe, to rely upon the experience of oil gas works, than upon mere representations of interested parties.

Messrs. Calvert, Dawes, and Burr call the attention of the committee to "the inconvenience of the odor arising from oil gas, compared to the offensive and destructive effluvia from rosin or coal gas."

Those of our citizens who have visited New York, are probably in the habit of estimating this property of coal gas from the exhalations in the lower part of that city, of the miserable gas from the pavement, as it issues out of the leaky, slovenly laid pipes, with the odors of which the earth and atmosphere are contaminated, wherever those pipes are conducted. Such estimation does great injustice to coal gas as it is now manufactured in well-conducted works. Those exhalations proceed from unpurified rosin gas. The following extracts would seem to settle that part of the subject.

From Ure's Dictionary of Arts, Manufactures, and Mines:

"After all, however, coal is much cheaper, and the gas from it is now so well purified, that oil and rosin are very little used in gas apparatus."

From the Encyclopedia Britannica:—"With respect to the smell of the two gases, they are so nearly the same, when the gases are properly purified, that it would be difficult to pronounce which of them is least unpleasant."

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Messrs. Calvert, Dawes, and Burr further say, that "the improved, or Solar Gas, is in comparison to pure oil gas as eight to ten; consequently, eight dollars' worth of Solar Gas is equal to ten dollars' worth of pure oil gas"; that "such is the result declared by the best chemists who have carefully examined their apparatus, and the operations of Crutchet's Atmospheric Mixer." The evidence of such declaration of those chemists has not been submitted to the committee. The gentlemen representing the "Solar Gas" were understood to say, that they knew of no scientific examination of the comparative illuminating property of the solar with oil gas. No confidence can be placed upon any examination not connected with such comparison.

In the absence of any data from which to estimate, or even to conjecture, the relative value of the two gases, the chairman of the committee made such an examination of the subject as was within his reach.

At the Solar Gas Works of Mr. Tillinghast Almy, of this city, the light of a burner with the "Solar Gas" was adjusted to an equality, by a comparison of shadows, with the light of a solar lamp, burning sperm oil. After being thus adjusted, the atmospheric air was shut out from the mixer. The immediate effect was, evidently, to diminish the pressure upon the gas, producing a less flow. The gas light immediately became of less size, and its light was much diminished below the light of the lamp. In about the time the pure oil gas should flow to the burner, the gas light gradually enlarged itself, and increased considerably beyond its original size, and its light became much stronger than the light from the lamp. On letting the air again into the mixer, the gas light gradually resumed its original size and strength.

This experiment, though necessarily imperfect, incontestibly proved that the "Solar Gas" has much less illuminating value than the pure oil gas. The difference was so marked, so great, that, so far as an estimate can guide from its appearance, it leaves a suspicion that the admixture of air injures the

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illuminating property of oil gas. The solar gas, however, was more soft and white than the pure oil gas.

It is a well-established fact, that an admixture of atmospheric air with coal gas, diminishes the illuminating power of the original gas, and such admixture is avoided as much as is practicable in coal gas works.

The gentlemen interested in the "Solar Gas" have been long notified as to the unfavorable position their gas occupied before the committee, in point of economy, as compared with coal gas. Under such circumstances, it is not unreasonable to believe, that if they could have shown any more favorable feature than the committee have seen, they would not have failed to produce it.

A very material consideration in favor of adopting coal gas in preference to the "Solar Gas," ought not to be overlooked. Coal is inexhaustible in its supply, the price decreasing as a greater quantity is demanded. Oil is uncertain, unsteady in price, and has been yearly increasing in demand and value, while the sources of supply are decreasing. Were its manufacture into gas, profitable at the present time, no reliance can be placed upon the future results of such manufacture. It is of some consequence, that the demand for oil should be in part relieved, that it may be better supplied for other uses.

If, on other grounds, the question was equal between the two gases, these considerations ought to decide in favor of coal, in the production of gas. But, apart from these, there can be but very little doubt thrown upon the preference for coal.

Believing that the interests of the City and the public convenience will be promoted, in giving the desired aid and countenance of the City to the introduction of Coal Gas, your committee recommend that the City Council authorize the City Treasurer to subscribe to the capital stock of the Providence Gas Company, with an understanding of a right to future subscriptions; and to contract with the Company, for gas for city purposes; provided, such contract can be made on as favorable terms to the City, as other cities are supplied with gas.

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The Resolutions which passed the Board of Aldermen, and were referred to your committee, are only declaratory of the will of the City Council, in relation to a subscription; provided an amendment to the charter of the Providence Gas Company, should be obtained, which would exempt the City from any liability, beyond its subscription, for debts contracted by the Company. Such amendment having been obtained, the subject admits of a more definite action.

The committee having other modifications to suggest, have deemed it more expedient to present, herewith, new Resolutions, rather than to attempt making the required amendments in the Resolutions referred to them.

Respectfully submitted,

EDWARD S. WILLIAMS, *Chairman.*

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